REMARKS

The Examiner has rejected Claim 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,882,572 to Lutze et al. ("Lutze") in view of U.S. Patent No. 6,337,461 to Yasuda et al. ("Yasuda") and U.S. Patent No. 6,433,304 to Okumura et al. ("Okumura"). The Examiner has also rejected Claims 12-29 under 35 U.S.C. § 103(a) as being unpatentable over Yasuda in view of Lutze and Okumura.

Claims 11 and 12 have been amended, in part, to include the limitations of Claims 22 and 23 respectively, and Claims 22 and 23 have been canceled. Minor amendments have also been made to Claims 13-21 and 24-29. Claims 1-10 stand previously canceled. Claims 11-21 and 24-29 are currently pending. The following remarks are considered by applicant to overcome each of the Examiner's outstanding rejections to current Claims 11-21 and 24-29. An early Notice of Allowance is therefore requested.

I. SUMMARY OF RELEVANT LAW

The determination of obviousness rests on whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. In determining obviousness, four factors should be weighed: (1) the scope and content of the prior art, (2) the differences between the art and the claims at issue, (3) the level of ordinary skill in the art, and (4) whatever objective evidence may be present. Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. The Examiner carries the burden under 35 U.S.C. § 103 to establish a prima facie case of obviousness and must show that the references relied on teach or suggest all of the limitations of the claims.

II. REJECTION OF CLAIM 11 UNDER 35 U.S.C. § 103(A) BASED ON LUTZE IN VIEW OF YASUDA AND OKUMURA

On page 2 of the current Office Action, the Examiner rejects Claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Lutze in view of Yasuda and Okumura. This rejection is respectfully traversed and believed overcome in view of the following discussion.

Amended, independent Claim 11 states, in part:

> "**switching off the laser beam for a period of time determining the first selected hole spacing** when an amount of radiation generating a detector signal that is greater than a predetermined threshold signal impinges on a detector arranged on the decorative side;
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> "**gradually increasing** the output of the laser beam from zero to a maximum of 100% of the laser's nominal value **over a time period** before starting to produce each hole, **where the time period** for the output of the laser beam to increase from zero to the 100% nominal value **is greater than a response time of the detector**;
>
> "switching off the laser beam immediately when a detector signal that is greater than the predetermined threshold is generated before reaching the maximum nominal value, which is caused by the absence of material or by a small amount of material of the planar extending article in the beam path **(pseudo-hole)** and prevents removal of the small amount of material and prevents overloading of the detector; and
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> "**selecting a second hole spacing between a pseudo-hole and a subsequent hole such that the second selected hole spacing is smaller than the first selected hole spacing.**" (emphasis added).

It is the explicitly stated intention of the invention to provide an improved method for producing a predetermined breaking line into one-layer and multilayer articles under the special condition, that "...the wall thickness along the desired predetermined breaking line can fall short of the desired residual wall thickness in places down to zero," Application, ¶ [0030].

Especially when considering woven material having a more or less regular pattern of threads, it occurs that positions at which directed laser radiation becomes at least partially absorbed, alternate in a fairly unpredictable manner with positions at which the said laser radiation may pass the material without any decrease of its power.

Therefore, the invention intends to tackle the task of machining one-layer or multilayer material, in which inhomogeneous consistence bears the risk of striking a detector with full laser output under a considerably unpredictable spatio-temporal pattern.

This is a basic difference with respect to the disclosures made by Yasuda, Lutze, and Okumura. Within the cited references, no handling of unpredictable "passing-through" of the full laser output lies within the scope of the respective inventions.

The invention claimed by Applicants discloses measures to overcome the disadvantage mentioned above. Several such steps of the method claimed are listed in Claims 11 and 12, respectively.

A. Gradually Increasing the Output of the Laser

In particular, as stated above, Claim 11 requires that the output of the laser beam is **gradually** increased to a maximum of 100% of the laser's nominal value **over a time period** that is **greater than a response time of the detector**.

It is thus disclosed by Applicants, that the progress of laser output increase is controlled in such a way that it meets specific characteristics of the detector, particularly the response time of the detector.

In other known embodiments, inclusive of those disclosed by Yasuda, Lutze, and Okumura, the laser output may gradually increase when the laser source has been switched on. This is because most, if not all, known laser sources need a certain time span to reach full power, and thus maximum output, after being switched on due to technical constrains. This *delay* in reaching the desired level of laser output *usually causes disadvantageous effects* like incongruencies among laser output commands and the laser output, as illustrated in Okumura Fig. 9. It is therefore **not an obvious step** for one skilled in the art, to incorporate this undesired circumstance in a controllable manner into a method.

Yasuda, Lutze, and Okumura disclose the need for a detector, which is capable of signaling the receipt of radiation power above a predetermined threshold. Furthermore, they suggest the presence of an article between the laser source and the detector at least at the beginning of the process of material removal. It will take a certain time for the laser beam to weaken or penetrate the article. This time span is longer than response time of the detector.

Okumura discloses a detector, which is adapted to pulse intervals of the laser output, but not to period of laser output increase. It is explicitly stated, that the method according to Okumura requires the use of pulsed laser output. In contrast, the

method disclosed by Applicants can be conducted using either pulsed or continuous laser output. Application, ¶ [0034] (2nd sentence).

Consequently, there is **no obvious need, teaching, or suggestion** for adjusting response time of the detector to the laser output increase or to select such a detector.

Using a detector having a response time larger than the time period of increase of laser output and conducting the methods disclosed by Yasuda, Lutze, and Okumura would not cause any disadvantageous effects. However, such a combination would not solve the problem stated above.

The measure described above was not disclosed by any of the other patent documents nor may this step be considered as obvious to a person skilled in the art. As such, the cited references fail to disclose that the output of the laser beam is **gradually** increased to a maximum of 100% of the laser's nominal value **over a time period** that is **greater than a response time of the detector**, as stated in Claim 11. In fact, the Examiner admits as much on page 5 of the current Office Action.

Furthermore, Applicants disagree with the Examiner that the Applicants have failed to provide an explanation of the problems which are solved by the gradual increase of laser output, or an explanation of the particular purpose of the gradual increase of laser output.

In particular, paragraph [0031] of the current Application states, in part:

> "This occurs when the material thickness of the material layer at this location is less than the desired residual wall thickness. In this case, no material is removed because the material is already sufficient weak in this area."

An additional purpose is given within section [0034]:

> "The relative slow increase of radiation output **prevents overloading** of the detector 7 on the one hand, on the other hand, **prevents a material puncture** at locations that are thinner than the desired residual wall thickness." (emphasis added).

Thus, Applicants disclose two problems, which are solved by a gradual increase of laser output: (1) preventing damaging the detector; and (2) avoiding puncturing

material. The applicant also discloses, how the progress of the increase of laser output must be configured to solve the said problems.

In other words, Applicants have disclosed how the gradual increase of laser output solves certain problems and is for a particular purpose. As such, it is **improper and untenable** for Examiner to assert that the above discussed limitation of Claim 11, which Examiner admits is **not** disclosed by any reference, is an obvious matter of design choice.

B. Selecing a Second Hole Spacing Between a Pseudo-Hole and a Subsequent Hole

Also as stated above, Claim 11 requires selecting a second hole spacing between a pseudo-hole and a subsequent hole such that the second selected hole spacing is smaller than the first selected hole spacing.

Ruling the selection of hole spacing after detection of a pseudo-hole is due to "...increase the likelihood that a thread will in fact be struck in a subsequent working step." Application, ¶ [0035] (last half-sentence). As explained within the Application, a thread is part of a woven material incorporated in the article to be worked on, and thus contributes to inhomogeneous material density. In fact, the above mentioned rule of selecting a second hole spacing establishes and defines a search algorithm as part of the claimed method.

The search algorithm is used to find the next relative position of the article and the beam path/detector, where wall thickness is large enough to absorb radiation of the laser to such a degree that radiation received by the detector at the decorative side of the article is below a predetermined threshold. It can be drawn from paragraph [0035], last sentence, that hole spacings must not be adjusted if no pseudo-hole has been detected. Thus, the adjustment of hole spacing made in case of detecting a pseudo-hole is not due to a pre-programmed sequence of hole spacings, but resembles an alternative response to a particular situation arising while an article is processed.

From paragraph [0035] in connection with paragraphs [0031], [0033] and [0034], it can be taken that the search algorithm will be repeated until "...the next point around which a blind hole is to be generated lies in the beam path...." Application, ¶ [0033]. It is also conclusive from paragraph [0035] that, in a situation in which the detector does not receive a signal larger than the predetermined threshold until the laser

output has reached its maximum nominal level, the search algorithm will not be initialized. It is also conclusive, that such a situation will lead to a termination of a still ongoing search process. This is, because Claim 11 just provide the rule of adjusting hole spacing **after** detecting a pseudo-hole. Therefore a decision on the adjustment of hole spacing is made after each single detection of an pseudo-hole. No hint for keeping the adjusted hole spacing for subsequent machining of the article is provided by the applicant.

Neither Yasuda, Lutze, nor Okumura disclose an algorithm for searching an area of a certain thickness of the article. It is also not obvious to a person skilled in the art to establish a search algorithm when considering the disclosures of Yasuda, Lutze, or Okumura.

As such, the cited references fail to disclose **selecting a second hole spacing between a pseudo-hole and a subsequent hole** such that the second selected hole spacing **is smaller than the first selected hole spacing**, as stated in Claim 11.

In fact, the Examiner admits as much on page 13 of the current Office Action. Rather, Examiner asserts that, since the Yasuda device is capable of having its laser beam move in such a way as to form a variety of different types of hole spacing, it would have been obvious to one of ordinary skill in the art to recognize that the modified Yasuda device is capable of producing a selected hole spacing between a pseudo-hole and a subsequent blind hole or microperforation which is less than the other hole spacings.

This, however, fails to meet Examiner's burden of establishing a prima facie case of obviousness. In particular, it is not whether or not the cited art can be modified to arrive at the current invention which is relevant in this instance, but rather whether there was any **motivation** to modify the cited art in such a way as to arrive at the invention of Claim 11.

In this case, the only motivation for modifying the hole spacing **after** detection of a pseudo-hole is provided by the current Application itself. In fact, other than the current Application, Examiner has failed to indicate any motivation to **select a second hole spacing between a pseudo-hole and a subsequent hole** such that the second selected hole spacing **is smaller than the first selected hole spacing**, other than the motivation provided by the current Application.

As such, the only way Examiner can combine the cited references to arrive at the invention of Claim 11 would be to use **hindsight**, which is wholly **improper** and **not allowed**. This, Applicants respectfully assert that the Examiner **cannot** combine the references in any **permissible** way to arrive at the invention of Claim 11.

Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of independent Claim 11. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claim 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,882,572 to Lutze et al. in view of U.S. Patent No. 6,337,461 to Yasuda et al. and U.S. Patent No. 6,433,304 to Okumura et al.

III. REJECTION OF CLAIMS 12-21 AND 24-29 UNDER 35 U.S.C. § 103(A) BASED ON YASUDA IN VIEW OF LUTZE AND OKUMURA

On page 6 of the current Office Action, the Examiner rejects Claims 12-29 under 35 U.S.C. § 103(a) as being unpatentable over Yasuda in view of Lutze and Okumura. These rejections are respectfully traversed and believed overcome in view of the following discussion.

A. Claims 12, 13, 15, 17, 19, 21, 25, 27, and 29

Similarly to Claim 11, amended, independent Claim 12 states, in part:

> "**switching off the laser beam for a period of time determining the selected hole spacing** when an amount of radiation generating a detector signal that is greater than a predetermined threshold signal impinges upon a detector arranged on the decorative side;
>
> "reducing the output of the laser beam prior to penetration of the laser beam into the final layer at least until the amount of radiation still being emitted generates a signal smaller than the threshold with full detection;
>
> "activating the detector and subsequently **increasing** the laser beam again **gradually over a time period** to a maximum of 100% of the laser's nominal value, **where the time period** for the output of the laser beam to increase to the 100% nominal value **is greater than a response time of the detector**;

> "switching off the laser beam immediately when a detector signal that is greater than the predetermined threshold is generated before reaching the maximum nominal value, which is caused by the absence of material or by a small amount of material of the planar extending article in the beam path **(pseudo-hole)** and prevents removal of the small amount of material and prevents overloading of the detector; and
>
> "**selecting a second hole spacing between a pseudo-hole and a subsequent hole such that the second selected hole spacing is smaller than the first selected hole spacing.**" (emphasis added).

As discussed above in relation to Claim 11, the cited references fail to teach or suggest: (1) **increasing** the laser beam again **gradually over a time period** to a maximum of 100% of the laser's nominal value, where the time period is **greater than a response time of the detector**; and (2) **selecting a second hole spacing between a pseudo-hole and a subsequent hole** such that the second selected hole spacing **is smaller than the first selected hole spacing**.

Also as discussed above in relation to Claim 11, Applicants have disclosed how the gradual increase of laser output solves certain problems and is for a particular purpose. As such, it is **improper and untenable** for Examiner to assert that the above discussed limitation (1) of Claim 12, which Examiner admits is **not** disclosed by any reference[1], is an obvious matter of design choice.

Further, as discussed above in relation to Claim 11, the only way Examiner can combine the cited references to arrive at the invention of Claim 12 which incorporates limitation (2) above, would be to use **hindsight**, which is wholly **improper** and **not allowed**. This, Applicants respectfully assert that the Examiner **cannot** combine

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[1] Regarding Claim 11, Examiner admits the limitation (1) is not disclosed by the cited references on page 5 of the current Office Action. Then, regarding Claim 12, Examiner blindly asserts that the modified Yasuda device discloses increasing the laser beam again gradually to its maximum power **without pointing to any support in the cited references**. As such, it is Applicants understanding that, regarding Claim 12, Examiner maintains the same "obvious matter of design choice" argument which is made regarding Claim 11 on page 5 of the current Office Action.

the references in any **permissible** way to arrive at the invention of Claim 12, which includes limitation (2) above.

Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of independent Claim 12, and corresponding Claims 13, 15, 17, 19, 21, 25, 27, and 29 because they are each ultimately dependent upon Claim 12. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claims 12, 13, 15, 17, 19, 21, 25, 27, and 29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,461 to Yasuda et al. in view of U.S. Patent No. 5,882,572 to Lutze et al. and U.S. Patent No. 6,433,304 to Okumura et al.

B. Claims 14, 16, 18, 20, 24, 26, and 28

Claims 14, 16, 18, 20, 24, 26, and 28 each ultimately depend from independent Claim 11. As Claim 11 is allowable, so must be Claims 14, 16, 18, 20, 24, 26, and 28. Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of Claims 14, 16, 18, 20, 24, 26, and 28. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claims 14, 16, 18, 20, 24, 26, and 28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,461 to Yasuda et al. in view of U.S. Patent No. 5,882,572 to Lutze et al. and U.S. Patent No. 6,433,304 to Okumura et al.

C. Claims 18-21

As stated above, Claims 18-21 are each ultimately dependent from one of independent Claims 11 and 12. As Claims 11 and 12 are allowable, so must be Claims 18-21.

In addition, Claims 18-21 each state, in part:

> "wherein the laser beam impinges on the working side at an angle of less than 90° relative to the direction of the predetermined breaking line in order to increase the length of the beam path in the planar extending article, which leads to removal of a greater amount of material with hole spacing remaining constant or allows greater hole spacing."

Examiner asserts that Yasuda discloses a system controller (20) and a positioning means (40) for controlling the degree, in which the laser beam will impinge (i.e. impinge at less than 90 degrees).

Within the disclosure of Yasuda, **no** hints for impinging the article at an angle other than 90° can be found, either in a written from or in a conclusive way. Furthermore, all figures illustrate exclusively articles onto which the beam path impinges at 90 degrees.

Additionally, in figure 7 and in the description of Yasuda (see Col. 3, Lns. 55-56), a Gauss distribution of power over the cross-section of the laser beam is explicitly given. Such a Gauss distribution causes a symmetrical and concentric power distribution around the middle axis of a laser beam. No alternative power distributions are mentioned. All figures in Yasuda illustrating a laser beam or its effect on an article (see Figs. 1-4, 7, 8, 9, 13, 10, 14, 17B, and 17C) only show configurations where impingement occurs at an angle of 90 degrees. They are all symmetrical.

An impingement under an angle of less than 90 degrees would cause a deviation from symmetrical and concentric power distribution, as the radiation would impinge the article in an oval instead of an round area.

Applicants thus respectfully assert that it would be **not** be obvious to a person skilled in the art that impingement at other angles than 90 degrees would be an alternative to the disclosure of Yasuda.

The Examiner also argues that Yasuda discloses a system controller (20) and a positioning means (40), which control the degree, at which the beam impinges the article.

The system controller (20) is described as being in contact with the sensor (2), the laser controller (30), the laser beam generating means (10), and the positioning means (40) (col. 5, 1-8).

Yasuda discloses the need for at least one microperforation of the article, to produce a reference point for subsequent machining. It is obvious, that a positioning means (40) is required to keep track of the score line in relation to the reference point.

It is **not** obvious, that the positioning means (40) and the system controller (20) are dedicated to enable impingement at angles other than 90 degrees.

There are **no** hints for controlling the degree of impingement by either the system controller (20) or the positioning means (40). As such, the cited references fail to teach or suggest the above language of Claims 18-21.

Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of Claim 18-21. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claims 18-21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,461 to Yasuda et al. in view of U.S. Patent No. 5,882,572 to Lutze et al. and U.S. Patent No. 6,433,304 to Okumura et al.

D. Claims 26 and 27

As stated above, Claims 26 and 27 are each ultimately dependent from one of independent Claims 11 and 12. As Claims 11 and 12 are allowable, so must be Claims 26 and 27.

In addition, Claims 26 and 27 each state, in part:

> "wherein when working an inhomogeneous material that is a woven material comprising longitudinal threads and cross threads, the first selected hole spacing is less than the thread diameter."

Examiner **admits** that the cited references fail to disclose the above language of Claims 26 and 27. Rather, Examiner merely asserts that the Yasuda device is **capable** of having its laser beam move in such a way as to form a variety of different types of hole spacings on multilayer, laminate and inhomogeneous materials, and that it would therefore have been obvious to modify the **general** disclosure of the cited references to arrive at the **specific** invention of Claims 26 and 27.

This, however, fails to meet Examiner's burden of establishing a prima facie case of obviousness. In particular, it is not whether or not the cited art can be modified to arrive at the current invention which is relevant in this instance, but rather whether there was any **motivation** to modify the cited art in such a way as to arrive at the invention of Claims 26 and 27.

In this case, the only motivation for modifying the first selected hole spacing to be less than the thread diameter, is provided by the current Application itself. In fact, other than the current Application, Examiner has failed to indicate any motivation to

select a hole spacing which is less than the thread diameter, other than the motivation provided by the current Application.

As such, the only way Examiner can combine the cited references to arrive at the inventions of Claims 26 and 27 would be to use **hindsight**, which is wholly **improper** and **not allowed**. This, Applicants respectfully assert that the Examiner **cannot** combine the references in any **permissible** way to arrive at the inventions of Claim 26 and 27.

It is thus **not** obvious to a person skilled in the art to set a first selected hole spacing at less than the thread diameter.

Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of Claims 26 and 27. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claims 26 and 27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,461 to Yasuda et al. in view of U.S. Patent No. 5,882,572 to Lutze et al. and U.S. Patent No. 6,433,304 to Okumura et al.

E. Claims 28 and 29

As stated above, Claims 28 and 29 are each ultimately dependent from one of independent Claims 11 and 12. As Claims 11 and 12 are allowable, so must be Claims 28 and 29.

In addition, Claims 28 and 29 each state, in part:

> "wherein the first selected hole spacing is equal to half of the thread diameter so that each thread is weakened by two holes insofar as the hole is not generated over the thread diameter."

Examiner **admits** that the cited references fail to disclose the above language of Claims 28 and 29. Rather, Examiner merely asserts that it would have been an obvious matter of design choice to modify the **general** disclosure of the cited references to arrive at the **specific** invention of Claims 28 and 29.

This, however, fails to meet Examiner's burden of establishing a prima facie case of obviousness. In particular, it is not whether or not the cited art can be modified to arrive at the current invention which is relevant in this instance, but rather whether there was any **motivation** to modify the cited art in such a way as to arrive at the invention of Claims 28 and 29.

In this case, the only motivation for modifying the first selected hole spacing to be equal to half of the thread diameter, is provided by the current Application itself. In fact, other than the current Application, Examiner has failed to indicate any motivation to select a hole spacing which is equal to half of the thread diameter, other than the motivation provided by the current Application.

As such, the only way Examiner can combine the cited references to arrive at the inventions of Claims 28 and 29 would be to use **hindsight**, which is wholly **improper** and **not allowed**. This, Applicants respectfully assert that the Examiner **cannot** combine the references in any **permissible** way to arrive at the inventions of Claims 28 and 29.

It is thus **not** obvious to a person skilled in the art to set a first selected hole spacing as being equal to half of the thread diameter.

Furthermore, defining hole spacing at one-half of the thread diameter causes threads to be struck "[e]ven when the thread spacing varies along the desired predetermined breaking line, ... either once in the middle or twice off center." Application, ¶ [0036] (last sentence). Selection of another hole spacing would cause the threads getting struck in a different way than described by Applicants. For example, a hole spacing smaller than one-half of the thread diameter would cause the thread to be, on average, struck more often by radiation, while larger hole spacing would cause a more rare striking. In case of selecting manyfolds of the thread diameter for hole spacing, potentially none of the threads get struck. Thus, the selection of the particular hole spacing of Claims 28 and 29 has been made in accordance to solve the problem of increasing likelihood of threads getting struck, even if their spacing varies.

Thus, Applicants provide a particular purpose, and explain, why the hole spacing should be selected as claimed.

Accordingly, Applicants respectfully assert that Examiner has failed to establish a prima facie case of obviousness of Claims 28 and 29. Therefore, Applicants respectfully request Examiner withdraw the rejection of Claims 28 and 29 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,337,461 to Yasuda et al. in view of U.S. Patent No. 5,882,572 to Lutze et al. and U.S. Patent No. 6,433,304 to Okumura et al.

Based upon the above remarks, Applicant respectfully requests reconsideration of this application and its early allowance. Should the Examiner feel that a telephone conference with Applicant's attorney would expedite the prosecution of this application, the Examiner is urged to contact him at the number indicated below.

Respectfully submitted,

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